Hydrodynamic response of a floating offshore wind turbine interaction with varying currents

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ABSTRACT

Survivability of complex structures in highly energetic events is a major challenge that needs to be overcome for extracting energy from the waves at a competitive price. When complex 3D structures are considered, experimental tests are often time and money consuming. Computational Fluid Dynamics (CFD) have become very popular in industry and academia, because of its relative ability to accurately simulate multiple extreme wave events at the same time and to complement experimental data.

The aim of this work is to analyse the hydrodynamic response of a moored floating offshore wind turbine (FOWT) under different constant currents (in magnitude and direction) with the numerical CFD model OpenFOAM [1]. The Overset Mesh Library [2,3] will be used for calculating the large displacements of the interaction of a moored FOWT under constant currents. MooDy Library [4] will be used to compute the mooring restraints. The stabilised turbulence model by Larsen & Fuhrman [5] has been included in the model in order to deal with the overproduction of turbulence levels. Loads exerted on the structure will be analysed.

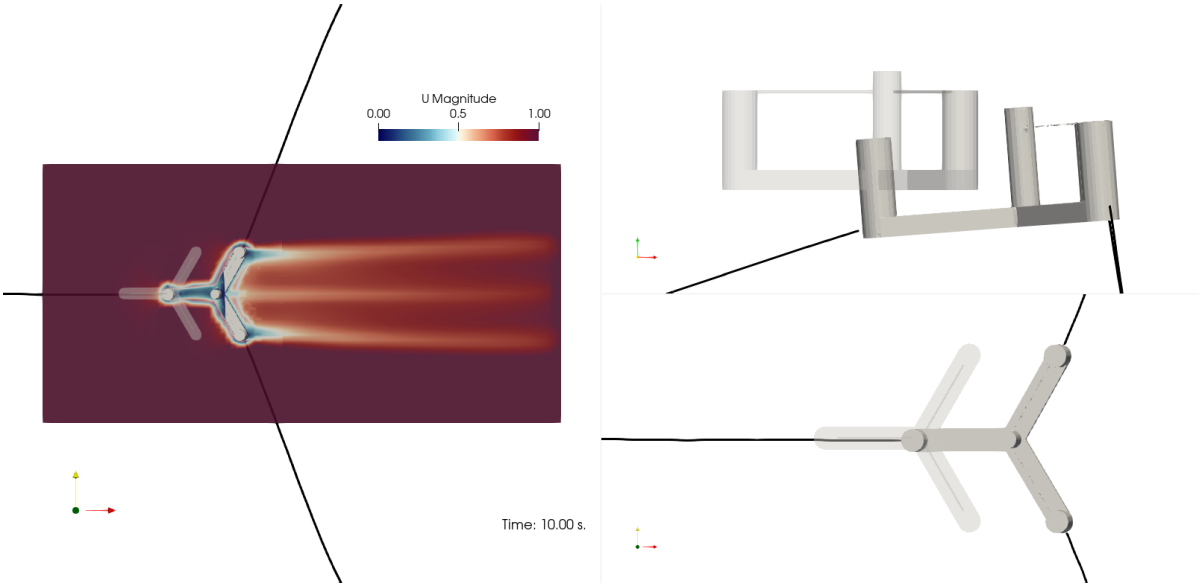

Figure 1: moored FOWT interaction under a constant current (U_c=1.0m/s). Left, velocity field on a plane XY, right, displacement of the FOWT from its initial position

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